Attachment 6
Progress, Partnerships,
and Path Forward:

DOE's Initiatives Concerning Protection of the Environment from the Effects of Ionizing Radiation

Coordination Meeting of
Standards Development Organizations

June 27, 2001

- Stephen Domotor -

Department of Energy

Office of Environmental Policy and Guidance

Increasing Interest in Radiation Protection of the Environment

- Revisiting ICRP assumption
- Different exposure pathways
- Site, regulator, and stakeholder interest
- International activity

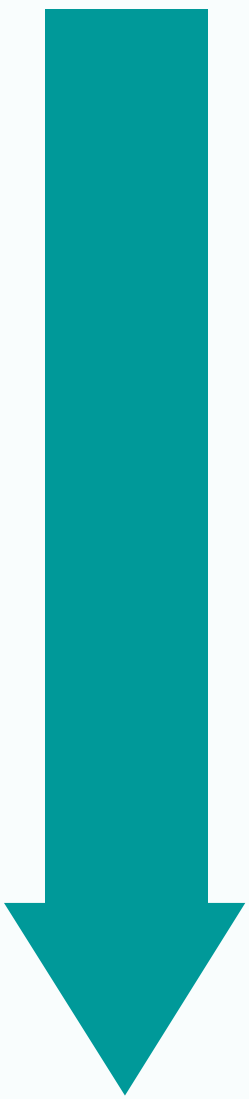
DOE Dose Limits and Need for Evaluation Methods

- Current DOE standard (*Order DOE 5400.5*): 1 rad/d for aquatic organisms
- Additional standards considered (*10 CFR 834 Sub Part F*): 1 rad/d for aquatic animals; 1 rad/d for terrestrial plants; 0.1 rad/d for terrestrial animals
- **Key theme in public comments: Guidance and methods are needed to support implementation of any proposed standards**
- **No standardized methods nationally or internationally**

DOE's Biota Dose Assessment Committee

- A DOE-wide initiative established in June 1998
- Lead role with EH-412 in DOE's Technical Standard
- An interdisciplinary team with broad representation (DOE sites; national labs; universities; private sector)
- DOE focal point for biota dose assessment and advisory role to Program and Operations Offices **(http://homer.ornl.gov/oepa/public/bdac)**
- **Methods developed through a consensus-based process to include "users" and "developers"**

DOE's Graded Approach



1. Data Assembly

2. General Screening

Compare media concentrations with BCGs

3. Analysis

- Site Specific Screening

Site-representative parameters

- Site Specific Analysis

Kinetic/allometric modeling tool

- Site Specific Biota Dose Assessment

Collection of biota using eco-risk framework

DOE Biota Technical Standard

MODULE 1: Principles and Applications (*user's guide*)

- Overview of the graded approach & evaluation process
- Application considerations
- Look-up tables; step-by-step guidance; RAD-BCG Calculator
- Examples

MODULE 2: Detailed Guidance (*links to user's guide*)

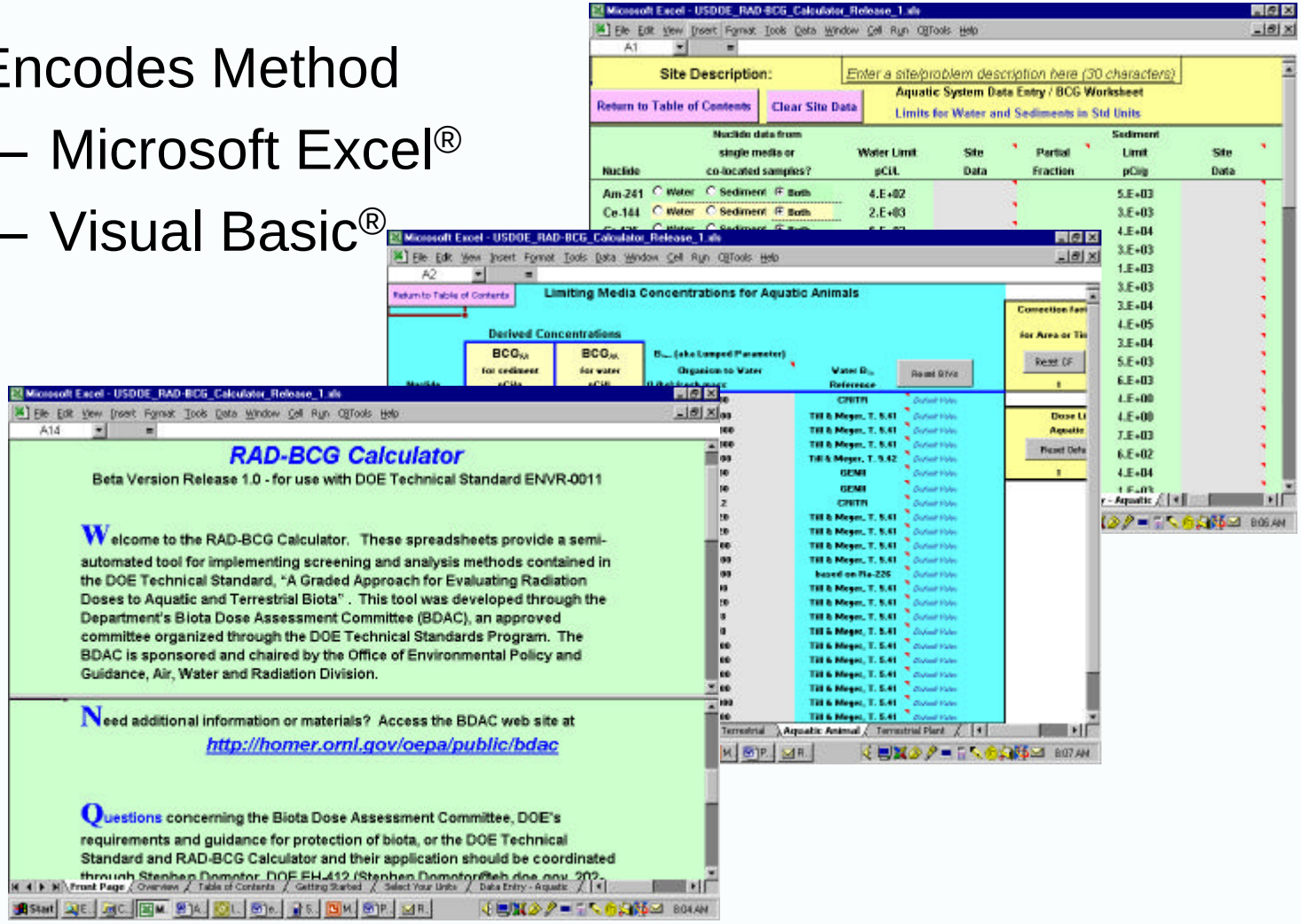
- Time averaging and spatial variability
- Defining the evaluation area
- Biota sampling methods and design
- Radiation weighting factor for alpha particles
- Evaluation of individuals; special considerations

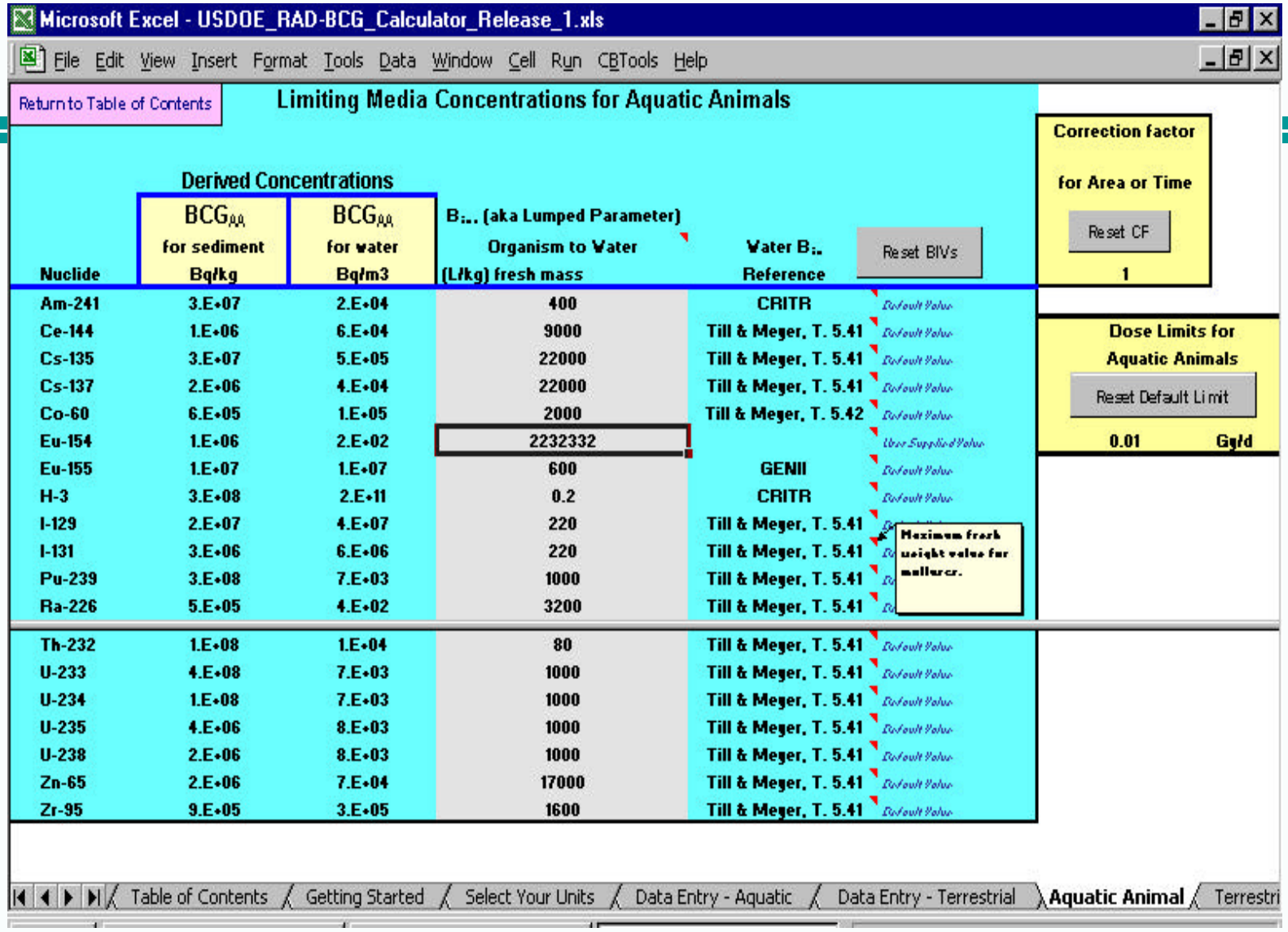
MODULE 3: Methods Derivation (*links to user's guide*)

- Equations and models for deriving BCGs / default parameters

RAD-BCG Calculator

- Encodes Method
  - Microsoft Excel®
  - Visual Basic®




Microsoft Excel - USDOE_RAD-BCG_Calculator_Release_1.xls
File Edit View Insert Format Tools Data Window Cell Run CBTools Help
Return to Table of Contents
Limiting Media Concentrations for Aquatic Animals
Correction factor for Area or Time
Reset CF
1
Derived Concentrations
Nuclide
BCGaa for sediment Bq/kg
BCGaa for water Bq/m3
Bi.. (aka Lumped Parameter) Organism to Water (L/kg) fresh mass
Water Bi.. Reference
Reset BIVs
Am-241 3.E+07 2.E+04 400 CRITR Default Value
Ce-144 1.E+06 6.E+04 9000 Till & Meger, T. 5.41 Default Value
Cs-135 3.E+07 5.E+05 22000 Till & Meger, T. 5.41 Default Value
Cs-137 2.E+06 4.E+04 22000 Till & Meger, T. 5.41 Default Value
Co-60 6.E+05 1.E+05 2000 Till & Meger, T. 5.42 Default Value
Eu-154 1.E+06 2.E+02 2232332 User Supplied Value
Eu-155 1.E+07 1.E+07 600 GENII Default Value
H-3 3.E+08 2.E+11 0.2 CRITR Default Value
I-129 2.E+07 4.E+07 220 Till & Meger, T. 5.41
I-131 3.E+06 6.E+06 220 Till & Meger, T. 5.41
Pu-239 3.E+08 7.E+03 1000 Till & Meger, T. 5.41
Ra-226 5.E+05 4.E+02 3200 Till & Meger, T. 5.41
Th-232 1.E+08 1.E+04 80 Till & Meger, T. 5.41 Default Value
U-233 4.E+08 7.E+03 1000 Till & Meger, T. 5.41 Default Value
U-234 1.E+08 7.E+03 1000 Till & Meger, T. 5.41 Default Value
U-235 4.E+06 8.E+03 1000 Till & Meger, T. 5.41 Default Value
U-238 2.E+06 8.E+03 1000 Till & Meger, T. 5.41 Default Value
Zn-65 2.E+06 7.E+04 17000 Till & Meger, T. 5.41 Default Value
Zr-95 9.E+05 3.E+05 1600 Till & Meger, T. 5.41 Default Value
Maximum fresh weight value for mollusca.
Dose Limits for Aquatic Animals
Reset Default Limit
0.01 Gy/d
Table of Contents
Getting Started
Select Your Units
Data Entry - Aquatic
Data Entry - Terrestrial
Aquatic Animal
Terrestri

Successes and Path Forward

- Interim Technical Standard approved for use since July 2000; now in use by many DOE sites
- Programmatic and technical reviews completed
  - **DOE Technical Standards Program**
  - **Papers peer-reviewed/accepted for publication**
  - **Independent peer review by Dr. Ward Whicker**
- Strong national and international interest/requests
- **National recognition through NAEP Environmental Excellence Award**
- Technical areas/refinements (direct air pathway)
- Final Technical Standard targeted for Fall 2001

National Coordination & Partnerships

- ***A proactive approach that is providing opportunities for methods "buy-in" and improvements***
- Federal Agency coordination through Interagency Steering Committee on Radiation Standards (Federal Guidance Subcommittee) and EPA Eco-Risk Forum
- Conferences and Symposia (HPS; SETAC)
- EPA-NRC-DOE partnership to develop "next generation" evaluation tool, "RESRAD-BIOTA"

International Coordination & Partnerships

- International Commission on Radiological Protection: *Task Group on Protection of Environment (2003)*
- Swedish Radiation Protection Institute: *Invitation by SSI for DOE-BDAC visit; interest in DOE's graded approach; RESRAD-BIOTA*
- International Atomic Energy Agency: *Specialists' Meetings (9/00;11/01) & proposed Conference (2003)*
- International Union of Radioecology: *DOE active with IUR leadership; FASSET initiative (2003)*
- Third International Symposium on Ionizing Radiation: *DOE on Scientific/Organizing Committee; Symposium in Darwin, Australia (July 2002)*

Contributing to an International Framework

- "A variety of models continue to be developed along these lines. The U.S. Department of Energy has developed a generic reference organism screening model (contained in their graded approach methodology) and generic/reference organism models are being developed as part of the FASSET programme. It was agreed that these approaches are, more or less, complimentary and that they could provide a basis for an agreed methodology within an international framework." From: IAEA Report of the Specialists' Meeting (Reference 723-J9-SP-1114.2; January 2001)

- ***Path Forward:* Continue to work closely with international organizations and member countries on harmonizing DOE and other approaches to support an international framework.**

A Sensible and Functional Tool

- Good compliance tool; equations and framework support its application in eco-risk assessments
- Technical Standard provides practical guidance on key application issues
- Conservative approach works in the absence of more sophisticated models
- Can address standards other than 10 mGy/d; different weighting factors
- Allows use of site and organism-specific input data
- ***Implementation experience shows utility of screening methodology and flexibility***

Contact Information

For further information on DOE's Biota Dose Assessment Committee or the DOE Technical Standard on biota dose evaluation please contact::

Stephen Domotor
U.S. Department of Energy
Office of Environment, Safety and Health
Office of Environmental Policy and Assistance
Air, Water and Radiation Division (EH-412)
1000 Independence Avenue, S.W.
Washington, DC 20585
USA (202) 586-0871
Stephen.Domotor@eh.doe.gov

DOE materials can be downloaded from the BDAC web site:

http://homer.ornl.gov/oepa/public/bdac